



VARI-CANT[®] Jet Aeration Systems

Water Technologies

SIEMENS



VARI-CANT® Jet Aeration System



VARI-CANT® Jet Mixing System installed in circular basin.

Superior Technology in Wastewater Treatment

Jet Aeration History

Jet aerators or educators have been utilized for gas/liquid contacting and mixing for over one hundred years. Over the past three decades, jet aeration has become widely accepted, and increasingly popular in wastewater treatment technology.

The VARI-CANT® jet aeration system utilizes proven principles of jet aeration, combined with state-of-the-art design and materials, resulting in a system with superior performance, efficiency and trouble-free operation.

Operating Principles

Submerged jet aeration intermixes air with a motive liquid and injects the stream into the wastewater. The aerator itself consists of two jet nozzles. The motive liquid - recirculated mixed liquor - is discharged from an inner nozzle into an outer mixing nozzle, within which compressed atmospheric air is introduced, and sheared into tiny bubbles which are entrained in the motive liquid stream.

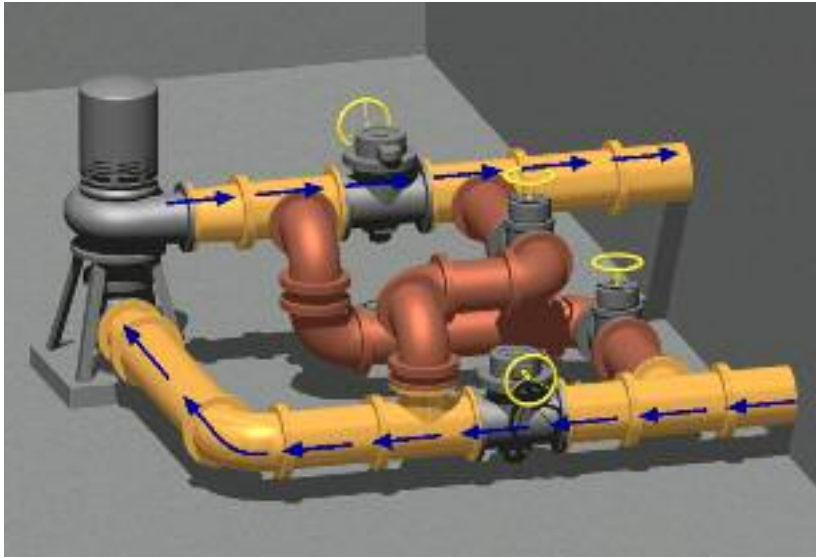
As the stream is discharged into the surrounding mixed liquor, it forms a highly turbulent jet plume. The plume entrains the surrounding mixed liquor and brings it into contact with the tiny air bubbles. The resultant oxygen transfer rate is extremely high. This efficiency is due to the high air/waste interface area created by the miniscule bubbles, the turbulence within the jet plume, and the extended bubble residence time.

VARI-CANT® Jet Aeration

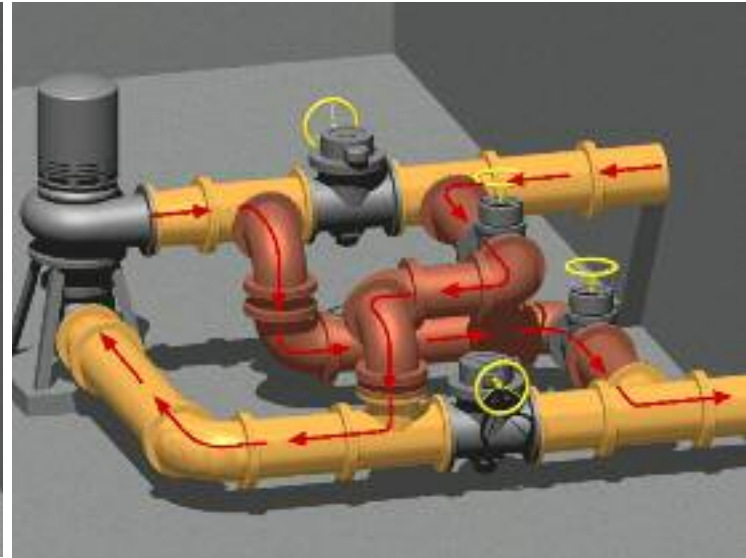
Submerged jet aeration systems have traditionally been designed with their nozzles discharging horizontally, usually no more than two feet off the reactor basin floor. Consequently, air blowers are required to operate against a static pressure nearly equal to the basin's total depth.

VARI-CANT® jet aeration systems are designed to be mounted higher, usually 2 to 4 feet (0.76 meters to 1.2 meters) above the basin floor. By mounting the nozzles at this higher level, significant savings in blower horsepower can be realized, thus cutting power costs.

VARI-CANT® jet aeration nozzles do not discharge horizontally, like traditional systems, but at a downward angle of 15 to 30 degrees, depending on basin geometry. This downward cant drives the bubbles as much as 2 feet (0.76 meters) deeper than their discharge depth. Full scale tap water oxygen transfer tests have shown the transfer efficiency achieved at a depth of 11 feet (3.3 meters) and a 30 degree cant is greater than a horizontal system at a depth of 13.6 feet (4.1 meters) according to an EPA study. Results such as these are typical. In most applications, a VARI-CANT® jet aeration system is superior in performance compared to horizontal systems mounted two feet deeper in the reactor basin.



Normal Flow of VACFLUSH® Cleaning System



Reversed Flow of VACFLUSH® Cleaning System

Jet Aeration System Cleaning

In some applications, jet nozzles can become plugged. If clogging occurs, efficiency and cost effectiveness drop. As the inner jet nozzles become blocked, the jet aerator loses its ability to produce the small bubbles necessary for optimum efficiency. When this occurs, the jet can lose as much as 50% of its efficiency, and is reduced to the performance level of a "coarse bubble" diffuser.

To assure high efficiency, positive effective cleaning is mandatory.

Vacflush® Cleaning System

The VACFLUSH® cleaning system is a piping and valve arrangement which uses the powerful suction of the jet motive pump to positively clean any debris from the jet nozzles. This is done by simply reversing flow through the jet nozzles. It takes only minutes, requires no tank draining or removal of equipment. The VACFLUSH® cleaning system is the most reliable cleaning system available today, and is recommended for any application utilizing dry pit pumps with large debris and minimal pretreatment.

Propeller Pump Flushout System

The flushout system utilized with submersible propeller pumps encompasses the same principles used in the VACFLUSH® cleaning system. The main difference between the two systems

is that the reverse flow across the inner jet nozzle is accomplished by simply reversing the pump motor on the submersible propeller pump. No valves or additional piping are necessary.

Pneumatic Backflush System

The pneumatic backflush system requires turning the submersible pump off and leaving the blower on. After a minute the discharge valve on the riser is opened where the back flushed material exits. This is recommended for small systems, or systems utilizing submersible motive liquid pumps.



Pneumatic Backflush Cleaning System



VARI-CANT® Jet Aeration System



VARI-CANT® Jet Aeration System installed in OMNIFLO® SBR

VARI-CANT® Jet Aeration System Advantages

Efficient, Flexible Operation

VARI-CANT® jet aeration systems provide efficient oxygen transfer, unmatched mixing, and up to 100 percent turndown while maintaining mixing. There are no moving parts in the basin with dry pit pumps, so operation and maintenance is minimal.

Proven Effective Self Cleaning

The VACFLUSH® cleaning system provides up to ten times more cleaning force than conventional cleaning methods and ensures an efficient operating VARI-CANT® jet aeration system with minimal maintenance.

Freedom from Maintenance

Cleaning systems eliminate the need for draining the basin and manually cleaning jets. This saves time and labor which improves cost effectiveness.

Highest Quality Materials and Workmanship

VARI-CANT® jet aeration equipment is designed and fabricated from the highest quality fiberglass (FRP) available for maximum strength and corrosion resistance. Other materials are available upon request to meet project specifications. All equipment is built, tested and inspected to the highest quality standards.

Independent Control of Mixing and Oxygen Transfer

The strong mixing action of jet aerators is independent of airflow rates, and allows the plant operator to match oxygen transfer rates to process conditions. The system permits airflow to be cut back during non-peak periods to save power.

Lower Energy Costs

The system uses less energy than any comparable gas/liquid contacting system. Compared with coarse bubble diffused aeration systems, the VARI-CANT® jet aeration equipment can result in energy savings of up to 50%.

Published Studies Show That

Fine bubble diffusers can lose as much as 50% of their "clean water" oxygen transfer efficiency when operating in wastewater. The excellent mixing and high turbulence created by the VARI-CANT® jet aeration system assures high transfer efficiencies in all types of wastewater.



VARI-CANT® Jet Aeration System installed in OMNIFLO® SBR.



VARI-CANT® Jet Aeration System during the react phase of the OMNIFLO® SBR.



Oxidation ditch installation

- Applications**
- Sequencing Batch Reactors
 - Biological Nutrient Removal (BNR)
 - Equalization Basins
 - Oxidation Ditches
 - Retrofits
 - Covered Tanks
 - Cold Climate Conditions



Earthen basin installation

- Primary Markets**
- Municipal
 - Food & Beverage
 - Petrochemical & Oil Refining
 - Pharmaceutical
 - Chemical / CPI
 - Landfill / Leachate
 - Pulp & Paper
 - Textile Industry

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